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PROCEDURES TO DETECT FOLIAR NEMATODES FOR ANNUAL NURSERY OR OUT OF STATE INSPECTIONS.

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In the early 1930's "State Plant Board" Inspectors found ***Aphelenchoides subtenuis*** (Cobb, 1926) Steiner & Buhrer, 1932 infecting ***Narcissus*** plants from many areas in Florida. So far, foliar nematodes have been detected in 470 samples including these early collections (Table 1). The principal pest species of foliar nematodes in Florida are ***Aphelenchoides besseyi*** Christie, 1942, ***A. fragariae*** Ritzema-Bos, 1890, ***A. ritzema-bosi*** (Schwartz, 1911) Steiner and Burher, 1932, and ***A. subtenuis***. Foliar nematodes have endoparasitic habits by invading leaf, petiole and floral tissue of the host plant. The infected plants are unthrifty, with discolored necrotic and deformed foliar parts and are thereby unsaleable. California prohibits the introduction of ***A. besseyi*** making foliar nematodes a regulatory as well as an economic pest.

Distribution: Foliar nematodes thrive best in warm humid conditions typical of the interior of many greenhouses where they can occur. Since most modern greenhouses have controlled temperatures, favorable to foliar nematodes, they can develop continously in infested sites and have a universal distribution under greenhouse conditions. Outdoors these parasites often occur in crops with dense vegetation such as strawberry (***Fragaria*** X ***ananassa***), chrysanthemum (***Chrysanthemum*** spp.) and ferns (***Asplenium*** spp.).

Hosts: Foliar nematodes infect many hosts (Table 1) in Florida. Ferns in general appear to be a preferred host. They also infect a number of aquatic plants, but unfortunately, they may not produce symptoms on these hosts in the aquatic habitat. Foliar nematodes also feed on many species of fungi, upon which they can subsist when live higher plant host tissue is unavailable.

Symptoms: The classical symptom of foliar nematode injury is necrotic areas scattered in the upper portion of leaf blades and delimited by leaf veins (Fig. 1). In bird's-nest fern necrotic symptoms develop at the frond base (Fig. 2) and progress upward until much of the frond is necrotic. Damage at the base results in extensive foliar dieback and sometimes death. In other hosts, such as azalea, necrotic areas may appear randomly on the leaf or frond surface. On ***Ficus elastica*** 'Decora' brownish yellowish streaks appear as lateral streaking from the midrib (Fig. 4-left). In several weeks the entire leaf is affected (Fig. 4-right) and several days later the leaf falls off carrying a large number of foliar nematodes that will migrate in the soil, producing a new source of inoculum. On strawberry and chrysanthemum these parasites cause flower abortion.

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FOLIAR NEMATODE SURVEY PROCEDURES.

Aquatic plants: Symptoms may not be evident on aquatic plants so random samples must be taken from the growth tanks if aquatic plants are being shipped to California. If plants are seen that are off color or with necrotic areas, such plants should be included in the sample.

Non-aquatic: Table 1 lists the prime target hosts of foliar nematodes detected in Florida plantings. When surveying for diseased plants, examine foliage and stems for necrotic areas. If bird's-nest fern is present, leaf bases should be checked for necrotic spots. Leaves or fronds exhibiting necrotic areas should be collected. If no necrotic leaf or stem symptoms are present in the survey area, foliar nematode is most likely absent and no foliar samples need be taken. Symptoms have been rarely noted on orchids, although foliar nematodes have been recovered from orchids a number of times. Orchid leaves showing necrotic spots, along with roots from the potting media, should be collected and submitted with the sample.

Aphelenchoides spp. are ubiquitous in Florida soils. Most of these soil dwelling forms are not phytoparasitic and feed on fungi. In the diagnostic results of regulatory samples these fungivorous species are indicated with the generic name only while the phytoparasitic forms will always have the species name shown, and usually a pest status statement.

Fig. 1. *Aphelenchoides besseyi* symptoms on *Rudbeckia*. Note necrotic tissue is separated from healthy tissue by leaf veins.

Fig. 2. *Aphelenchoides fragariae* symptoms on young bird's-next fern. Note basal necrosis.

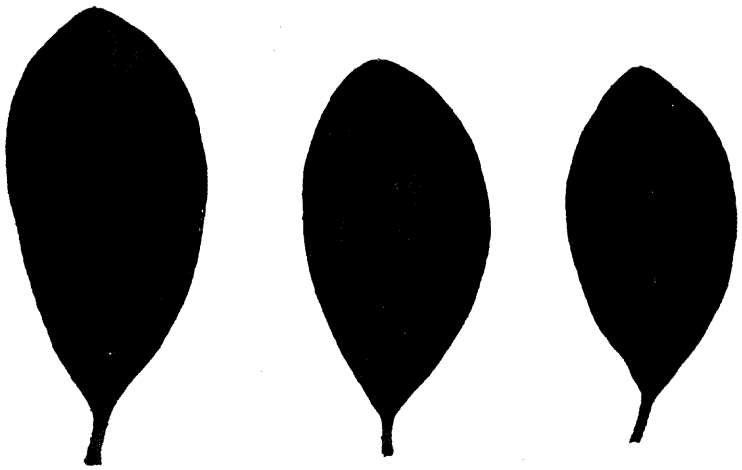

Fig. 3. *Aphelenchoides fragariae* on azalea.

Fig. 4. *Aphelenchoides fragariae* on *Ficus elastica* 'Decora'. Left: whole plant showing initial leaf streaking symptoms. Right: a leaf several weeks following initial symptoms.

Table 1. Principal target host of foliar nematode based on 470 nematode examinations.

Plant Host	Aphelenchoides species/ Frequency of occurrence		
	besseyi	fragariae	ritzema-bosi
Asplenium sp.		1	
Asplenium bulbiferum		1	
Asplenium jamaicense	1	1	
Asplenium nidus*		130	1
Asplenium squamosum		1	
Asplenium viviparum		1	
Rhododendron sp.		11	
Rhododendron sp. 'Glowing Embers'		2	
Rhododendron sp. 'Lentine'		1	
Rhododendron sp. 'Road Runner'		5	
Rhododendron sp. 'Valentine'		50	
Rhododendron sp. 'Vivian Moss'		3	
Rhododendron sp. 'Whitewater'		4	
Rhododendron indicum		1	
Narcissus sp.*		27	
Hibiscus sp.		1	
Hibiscus rosa-sinensis 'Giant Scarlet'		22	
Ficus sp.	6		
Ficus benjamina		1	
Ficus elastica 'Burgundy'		1	
Ficus elastica 'Decora'	1	14	1
Pityrogramma sp.		12	
Pityrogramma chrysophylla		2	
Pityrogramma triangularis		1	
Begonia sp.		8	
Begonia X hiemalis		5	
Begonia X rex-cultorum		1	
Chrysanthemum sp.		6	2
Chrysanthemum maximum			1
Chrysanthemum X morifolium	2		1
Barleria cristata		11	
Sinningia speciosa			9
Pteris sp.		6	
Pteris cretica 'Parkeri'		2	
Pteris vittata		1	

Additional Hosts

Anthurium acaule		4	
Anthurium salviniae		1	
Adiantum seemanii		1	
Barleria cristata		1	
Cabomba sp.		2	
Cabomba caroliniana		3	
Callistephus chinensis			1
Ceratophyllum demersum		3	
Cibotium sp.	1		
Davallia trichomanoides f. barbata		1	
Didiplis diandra		1	
Fatsia sp.			1
Fragaria sp.	3		
Fragaria chiloensis		1	
Hydrilla verticillata		3	
Jasminum sp.	1		
Jasminum volubile	1		
Lemna sp.	1	2	
Limnobium spongia		1	
Limonium sp.			1
Lygodium circinatum	1		
Lygodium clavatum	1		
Medicago sativa		1	
Myriophyllum spicatum		2	
Najas flexilis		3	
Orchidaceae		5	1
Peperomia argyreia			1
Phyllitis scolopendrium		4	
Platycerium ellisii		1	
Rosa sp.	1		
Rudbeckia hirta	1		
Sagittaria subulata		2	
Setcreasea pallida 'Purple Heart'	1		
Sporobolus poiretii	2		
Tectaria heracleifolia		1	
Thelypteris reptans		1	
Utricularia foliosa		1	
Vitex negundo		1	

* Aphelenchoides subtenuis earliest reports only in the 1930's with 1 and 46 occurrences of A. nidus and Narcissus sp., respectively.

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